



*Advancing
Astronomy and
Geophysics*

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The Royal Astronomical Society (RAS) welcomes this opportunity to comment on the proposed strategy for the Science and Technology Facilities Council (STFC). This submission is based on the questions posed by the consultation document - but is not constrained by them.

A. The Crucial Role of Curiosity –Led Research

- *STFC 's strategy should be based on an unapologetic assertion of the value of fundamental or basic research since all the other, desirable and necessary, benefits listed, including commercial contracts, ultimately flow from this. Without a healthy base of fundamental research the UK will not produce major scientific break-throughs (or enjoy their attendant recognition, such as Nobel Prizes). While the document acknowledges the role of curiosity led research, it should be at its core (and 'headlined' appropriately).*
- *Similarly, while appreciating the benefits of linking relevant STFC research to RCUK/DIUS cross cutting themes, like security and global warming, there should be continued support for stand-alone 'genuinely blue-skies' research*
- *While STFC research can make, and has made, major contributions to meeting government priorities (Health and Wellbeing; Economic Wellbeing et al), it would be misguided to attempt to contrive such contributions from all parts of its research portfolio equally. In particular, the potential impact of much of astronomy research is impossible to predict; its(many and real applied) benefits , by definition, have arisen as unintended outcomes from investigations into fundamental questions (the 'Universal challenges') about the nature of the universe.*
- *That said, astronomy research can **guarantee** to make a major contribution to the improvement of the nation's well being , given the large numbers who make a career in other walks of life, by producing graduates and post-graduates with high-level, transferable, skills. In addition, there is evidence that many other graduates in STEM subjects were inspired by astronomy as school pupils to opt for STEM*

subjects. The quantifiable outcomes in terms of life time contributions to the economy of particularly physics students is, probably, significantly greater than those obtainable from knowledge-transfer. Finally, the reputation of UK astronomy research attracts overseas talent to work in the UK.

- Other parts of the research community represented by the RAS, in particular those covered by the 'Near Universe' panel, are more easily able to address government priorities particularly 'The Changing Environment', 'Energy and Sustainability' and 'Safety and Security'.
- STFC's strategy should seek to develop clear and open processes for balancing its research portfolio across different research motivations including (a) curiosity-led research, (b) use-inspired fundamental research and (c) translational research that has clear applications in mind. These processes should include regular consultation with the wider community and the involvement of senior scientists on appropriate panels and boards. In reaching a considered view on the balance across research motivations, STFC should be mindful that translational research is also open to significant sponsorship by other agencies and industry, while fundamental research (both curiosity-led and use-inspired) is primarily dependent on sponsorship by the Research Councils. While acknowledging the importance of economic and societal impact, it would be counter-productive to rank individual proposals on the basis of potential application, especially in the curiosity-led area. Such ranking should rest on scientific excellence exclusively
- It is important, therefore, that the advisory panels established by PPA are properly resourced to accomplish their, difficult, tasks. It will be a false economy to 'do this on the cheap' since, learning the lessons of the past year, securing community confidence in their outcomes is vital. It is also important that, if they are undertaken in the thorough way required, advisory panel recommendations are treated very seriously and that if any are not accepted by the Science Board or Council, a full and public explanation should be forthcoming
- That said, there is a case for 5 or 10 year reviews, on the lines of the US Decadal Review, to thoroughly investigate options and agree long range 'road maps'
- In addition to striking a balance between curiosity-led and application-led research, the strategy also should make explicit the process by which it will achieve an optimum balance between investment in facilities and the provision of funds available to researchers to exploit the results emanating from them (as well as results from non-STFC supported facilities). Astronomers and space scientists enjoy the benefits of many international and bilateral projects including ESO and ESA. However there is real concern that the exploitation of these facilities is not adequately provided for in the level of grants, a situation exacerbated by the shortfall in the STFC budget in the last spending round. On the other hand assembling an

engineering team capable of conceiving and developing truly innovative instruments such as SCUBA or SCUBA-2 takes decades and care must be taken not to lose skills which could take a generation or more to replace.

B. Ranking Priorities

- *Regardless of the outcome of the next spending settlement, there is a recognition that, if UK scientists are to take **leading** parts in international projects, there may need to be more focus with a smaller number of STFC funded research activities*
- *The RAS cannot make 'ex cathedra' statements about the relative importance of current or planned STFC activities. It can, and does, facilitate community discussion of them and is anxious that the **process** by which priorities is set is transparent and broadly based. A starting point should be investigations already undertaken with strong community involvement e.g. the ASTRONET and ESFRI road maps, ESA Cosmic Vision and the Astroparticle ERAnet (ASPERA) roadmap. Peer review on the basis of scientific excellence, despite some shortcomings, is superior to other ways of ranking options. Placing disproportionate weight on secondary considerations, such as wider impact, will lead to reduced funding for the best science.*
- *The existing structure of 'Town Meetings', online consultation and engagement with researchers at events like the National Astronomy Meeting works best when attendees feel they have the opportunity and time to meaningfully contribute to the decision-making process. Community consultation should be genuine dialogue and not used to explain decisions already taken.*

C. Other

- *There is a strong case (highlighted in the Wakeham review) for investment in High-Performance Computing (HPC) to be increased to bring the UK into line with other industrialised nations. Such facilities would be of great benefit to researchers in the area of theoretical astrophysics but could also serve many other scientific disciplines.*
- *International subscriptions to facilities and projects are in many cases calculated on the basis of Net National Income (relating to GDP measured in e.g. Swiss Francs). Economic and exchange rate fluctuations can cause unforeseen pressures on budgets available for other areas of research and hence has an impact on long-term investment plans. We welcome the funds provided by DIUS that provide some measure of protection from 2008-11 but ask that this is made permanent.*
- *The British National Space Centre (BNSC) has not served the space science community as well as it might have done. BNSC lacks a clear identity and as a partnership of many organisations has been unable to provide the leadership the sector requires. The UK, in company with all analogue countries, should have a free-standing space agency, possibly located on one of the STFC campuses, that has the skills and*

resources needed to take forward UK engagement with ESA, NASA and other partners.

- *There is a case for translational research and knowledge transfer being handled by a cohort of experts rather than by diverting scientists away from their core activity*

David Elliott
Executive Secretary